

REMARKS/ARGUMENTS

Reconsideration is respectfully requested of the Official Action of September 15, 2003, relating to the above-identified application.

Claim 1 has been amended to clarify, in line 9, that the hydrogen peroxide crystals are in a suspension in order to provide antecedent basis for the term "the suspension" appearing in line 10. Also, in line 14, the word "hydrogen" has been corrected. Amendment of Claim 1 does not involve any reasons relating to patentability.

Non-elected Claims 20 and 21 have been withdrawn without prejudice to the filing of a divisional application directed to that subject matter.

New Claim 22 is presented herewith based on original Claim 1 and original Claim 12. No new matter is presented by new Claim 22.

The claims in the application are Claims 1-19 and 22.

The introduction to the present patent application points out that there is an interest in obtaining more highly concentrated hydrogen peroxide because of the desirable properties of that material and the fact that the highly concentrated material can be used for a variety of applications. There have been many efforts in the past to prepare concentrated hydrogen peroxide but such prior art processes have not always been found to be commercially successful.

The present invention provides a simple way to obtain an unforeseeable high degree of efficiency by suspension crystallizing aqueous hydrogen peroxide and after treating the resulting

cooled material with a molten hydrogen peroxide for washing the hydrogen peroxide crystals obtained in the suspension crystallization process.

It is noted that the Official Action points out that the application currently names joint inventors. Counsel is advised that the inventorship of the application does not change as a result of the deletion of Claims 20 and 21.

The rejection of Claims 1-19 under 35 U.S.C. § 103(a) in view of the British reference to *Geoffrey, et al.* (GB Pat. 889421) is traversed and reconsideration is respectfully requested. The Official Action points out that the British reference discloses a process for purification of hydrogen peroxide by crystallization and countercurrent washing using hydrogen peroxide. The Official Action admits that the British reference does not teach the higher stated concentration of 85-95 weight percent that is claimed in the present invention, for example. However, applicants respectfully submit that patentability in the present application is based on the fact that the British patent does not teach the use of a molten hydrogen peroxide under the conditions set forth in the present application. Thus *Geoffrey* teaches a process for purifying hydrogen peroxide by crystallization, wherein the crystals formed in the crystallization are washed with a solution of aqueous hydrogen peroxide of substantially the same hydrogen peroxide concentration as the mother liquor formed in the crystallization step. This is pointed out in the reference at pg. 2, lines 53-74, pg. 3, lines 103-104, and pg. 4, lines 39-45.

The British reference teaches that the washing process is to be performed under isothermal conditions and that the hydrogen peroxide concentration in the liquor should be the

same at any stage of the washing column. This is noted on pg. 3, lines 93-99. It will be seen that the British patent explicitly teaches that the washing column has to be designed in such a way to prevent the molten product formed in the heat exchanger from passing through the bed of crystals. In this regard, see pg. 3, lines 89-93 of the British patent.

In distinct contrast, the process of the present invention contains as an essential feature, the washing of the hydrogen peroxide crystals obtained in the suspension crystallization process in a packed crystal bed using molten hydrogen peroxide as the washing medium. As explained in the present application, for example, beginning on pg. 7, line 30, the starting material hydrogen peroxide need only be cooled marginally below the equilibrium temperature in order to form crystal nuclei. Cooling in the range from greater than 0 to 5 K and, particularly, from 0.5 to 3 K below the equilibrium temperature is highly suitable. It is pointed out at pg. 8, beginning at line 8, that cooling is carried out to the temperature required in order to achieve adequate crystal growth following nucleation.

Thus, it is clear that the molten hydrogen peroxide product used as the washing medium, in accordance with the invention as set forth in the claims in this application, is necessarily at a higher temperature than is the crystallization suspension obtained as a result of the crystallization step because it has a higher hydrogen peroxide concentration than the starting material. The molten product has to be fed to the countercurrent washing column at this higher temperature and cannot be fed at the temperature of the crystal suspension obtained in the crystallization step because the molten product with the high hydrogen peroxide content would almost completely

solidify at this lower temperature. Consequently, the countercurrent washing column of the process of the present invention cannot be operated isothermally as required by the British patent. The non-isothermal operation of the washing column as a condition of the present invention is a prerequisite for concentrating hydrogen peroxide to a higher content, particularly for concentrating hydrogen peroxide solutions with 85 to 95 weight percent hydrogen peroxide to a concentration of over 98 weight percent.

The washing solution of substantially the same hydrogen peroxide concentration as the hydrogen peroxide crystals in the packed crystal bed according to the British patent process is to be contrasted with the process of the present invention which requires washing with a molten product; i.e., a product at a much higher temperature than the hydrogen peroxide crystals in the packed crystal bed. Carrying out the process of the British patent using a molten product would result in an inoperable process. If a molten product is fed at the temperature of the mother liquor of the crystallization, which is necessary to maintain isothermal conditions in the washing column according to the British patent, the melt would either solidify before it could be fed or, if the melt could be fed supercooled, the melt would solidify inside the column with the formation of considerably less liquor than the 38% by weight of the total product required to operate the column as indicated in the British patent on pg. 4, lines 90-94. Hence, it can be seen that applicants' process operates on a completely different principal, namely, a non-isothermal operation which differs in an unexpected and substantial way from the isothermal operation that is disclosed in the British patent.

There is no suggestion, reason or motivation given in the Official Action as to why a person skilled in the art would change the conditions in the British patent to arrive at applicants' process. Moreover, there can be no suggestion of the unexpected nature of the results that are achieved in accordance with applicants' process as pointed out in this present application; namely, the achievement of very high concentrations of hydrogen peroxide.

With regard to the dependent Claims 2-19, and new Claim 22, the same reasons for patentability apply as discussed above. There is no motivation, suggestion or reason in the cited reference whereby a person skilled in the art would be led to make the changes necessary to arrive at applicants' invention as described and defined herein.

For the reasons set forth above, the rejection of Claims 1-19 is not well founded and should be reconsidered and withdrawn.

Favorable action at the Examiner's earliest convenience is respectfully requested.

Respectfully submitted,

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